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A REPORT TO CONGRESS ON WATER POLLUTION CONTROL MANPOWER DEVELOPMENT AND TRAINING ACTIVITIES

ENVIRONMENTAL PROTECTION AGENCY

DECEMBER 31, 1973

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A REPORT TO CONGRESS
ON WATER POLLUTION CONTROL
MANPOWER DEVELOPMENT AND TRAINING ACTIVITIES

BY

THE ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF WATER PROGRAM OPERATIONS

WASHINGTON, D.C. 20460

DECEMBER 31, 1973

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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

THE ADMINISTRATOR

JAN 17 1974

Dear Mr. President:

I have the pleasure to forward herewith a Report to Congress on Water Pollution Control Manpower Development and Training Activities. The Report is submitted pursuant to Section 104(g)(4) of the Federal Water Pollution Control Act.

Sincerely yours,

Russell E. Train

Honorable Gerald R. Ford
President
United States Senate
Washington, D.C. 20510

Enclosure

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PART I. INTRODUCTION

A. PURPOSE AND SCOPE OF THIS REPORT

1. Authority - Subsection 104(g)(4) of Public Law 92-500 dated October 18, 1972, requires that: "The Administrator shall submit, through the President, a report to the Congress not later than December 31, 1973, summarizing the actions taken under this subsection and the effectiveness of such actions and setting forth the number of persons trained, the occupational categories for which training was provided, the effectiveness of other state and local training programs in this field, together with estimates of future needs, recommendations on improving training programs, and such other information and recommendations, including legislative recommendations, as he deems appropriate."

2. Scope of Report - This report has been prepared as a supplement to EPA Report to the Congress, Number 92-36, dated March 1972, pertaining to water pollution control manpower and development training activities. In this supplement, special emphasis is placed on the potential impact of Public Law 92-500 relative to manpower and training program activities. The original EPA Report to the Congress, is to be considered as the primary source document relative to EPA manpower development and training program strategies and activities and programmatic findings, conclusions and recommendations predicated on manpower demand and supply and other factors unless otherwise specified by information contained in this supplement.

B. MANPOWER - IMPLICATION OF PUBLIC LAW 92-500

The 1972 Amendments are considered to be the most extensive and far reaching legislation ever enacted at the Federal level pertaining to water pollution abatement and control. The law sets the stage for a coordinated series of actions that must be taken within stringent guidelines and enforcement provisions by both federal, state, and local governments and industry.

Summarized below are some of the more important requirements of the legislation, all of which impact on current and future manpower and training needs.

1. Federal construction grant authorizations have been significantly increased for municipal water pollution control in order to assist local communities to build wastewater treatment plants and systems.

2. Additional funds are authorized in the legislation, totalling two and three quarter billion, to reimburse local governments for treatment plants constructed prior to the enactment of the current bill.

3. The Federal Government share for providing funds for construction is 75% in lieu of the 55% under old legislation.

4. At least "secondary" treatment will be required for municipal plants constructed prior to mid-1974 and best practicable treatment will be required for plants constructed after that time. (All treatment plants must provide a minimum of secondary treatment by mid-1977).

5. Area wide waste treatment management plans will be required to be devised by mid-1976 in areas where significant water pollution control problems exist.

6. INDUSTRIAL POLLUTION: (a) industries will be required to pretreat

effluents before they are discharged into the municipal treatment systems; (b) industries will be required to have the best practicable control technology by mid-1977 and the best available by 1983; and (c) discharge of toxic pollutants listed by EPA must meet effluent standards to be promulgated by mid-1974.

7. STATES: The overall framework for management of state water quality planning is delineated in the new legislation under Sections 303(e), 208 and 201. The state wide water quality planning required by Section 303(e) is the central tool of the states in administering their water quality programs. The planning process provides direction to resource expenditures to the establishment of priorities and appropriate schedules of action. It also provides the goals and framework for construction grant planning in area-wide planning required by Sections 201 and 208. These management processes are designed to achieve maximum effectiveness from state water pollution control programs. The following are indicative of some of the responsibilities or opportunities for the States: (a) states must adopt water quality standards for interstate waters and periodically report on the quality of their waters within their borders; (b) states are required to submit reports on non-point sources of pollution and establish and recommend various control programs; (c) states must submit an annual water quality inventory; (d) states may issue permits (if not, EPA will issue the permits) which require that no source can discharge any pollutant into any waterway of that state without permission of that state; and (e) all states, regardless of the permit issuing authority, will periodically inspect facilities in order to assure adherence to the permit application requirements and to take action where operations and maintenance result

in violations of discharge limitations. These programs are expected to stimulate more comprehensive state programs in operations and maintenance as well as the administration and enforcement of state operator certification programs. It is also expected that states will develop and administer effective training programs for all levels of personnel in water pollution to assure abatement and control success.

8. MUNICIPALITIES: Water quality, effluent limitations and permit compliance requirements will require many local communities to provide for more stringent operation and maintenance procedures and practices including: (a) additional manpower for 24-hour-a-day waste treatment plant operation; (b) additional record keeping, particularly test results and other efficiency elements; (c) additional and more complex water analysis testing procedures to assure maximum plant efficiency and proper effluent discharge (automatic monitoring and sampling equipment will necessitate new operator/technician skill and knowledges) and (d) adoption of user charges to pay the costs of operation and maintenance.

9. FEDERAL ACTIVITIES - (a) the Federal Government, including EPA, is expanding its programs in accordance with the new legislation. (Federal facilities, under Section 313 of the Act, must comply with federal, state and interstate and local water pollution control and abatement requirements to the same extent that any person is subject to such requirements). (b) Federal agencies having water pollution control facilities must meet the higher water quality standards and effluent limitations. (c) Agencies may be expected to provide for more extensive training of their personnel

in order to improve their treatment operations; and provide for possible certification of operator personnel within the state. (d) EPA, with the assistance of the states must provide for: A system of permit issuance including a system of surveillance, monitoring and enforcement; the establishment of water quality standards and effluent limitations; the development of new technologies, and the issuance of guidelines for proper operations and maintenance; for the development of training programs;and for numerous activities, including the abatement and control of other sources of water pollution control such as: agricultural, rural, thermal, oil and hazardous material dumping and spillage, sedimentation, acid mine drainage, etc.

C. CONCLUSIONS

1. From information gathered during FY-73, implementation of the 1972 Amendments to the Federal Water Pollution Control Act indicates that a greater number of new personnel and additional numbers of better trained personnel must be available to the federal, state and local sectors than initially estimated in the 1972 Manpower and Training Report to the Congress. Such increases are attributed to intensified waste treatment plant construction, more stringent water quality standards and effluent limitations, increased regional, state and local planning requirements and the administration and enforcement of a "permit" program.

2. EPA water training programs continue to satisfy at least in part the unmet needs of various employer groups and their employees in numerous occupational categories (professional, operator and technician) who constitute the existing or potential manpower pool required to control water pollution.

3. Emphasis continues to be placed on having the state and local water pollution control agencies define manpower and training needs of their jurisdictions through the establishment of manpower planning capabilities and meet these needs through their established educational institutions. Further efforts to extend and intensify operation and maintenance training will be important elements.

4. (a) The current supply of professionals (scientists and engineers) qualified in water pollution control cannot fill the technical requirements of the field under present circumstances. Demand will continue particularly for sanitary, chemical and civil engineers as a result of increased waste treatment plant construction, more stringent water quality standards and effluent limitations. To the extent that financial support to professional training programs at the graduate level is of interest, EPA, through its Training Grants Program, has been one source of funds.

(b) The EPA Undergraduate Training Grants and Scholarship Program has been operating to satisfy some of the unmet needs for entry training of senior level technicians and operators. EPA has developed a program of Agency fellowships for professional employees of state and local agencies for special training programs unrelated to degree programs, to fulfill some of the demand for a management training need which results from the new requirements of the 1972 Act.

5. (a) Waste treatment plant operator training (entry and upgrade) remains an important element as a result of increased plant construction,

effluent limitations, and the need to bring plants to efficient operation and as near "design" capacity to meet EPA Permit Program water quality requirements. A 1973 study by the Municipal Waste Water Systems Division of EPA's Office of Water Program Operations on the effectiveness and efficiency of existing treatment plants, indicates serious impairments by under-staffing and under-training of operation and maintenance personnel (see Clean Water Report to the Congress 1973 (pages 43-46). Particular emphasis needs to be placed in training "higher skilled operators" in activated sludge techniques, digestion, process control, instrumentation, etc., in order to meet secondary treatment standards called out by the new legislation.

(b) More highly trained technicians will be required in the future as compared to the substantial majority of technicians today. Update training of these technician personnel has become increasingly more important as a result of reporting requirements outlined under the National Pollution Discharge Elimination System. The system requires performing complex water analysis tests and reporting within strict time intervals.

6. EPA will be required to place additional emphasis on determining national manpower training needs relative to other sources of water pollution, i.e., thermal sources, feedlots, various other agriculture wastes, mine drainage, oil and hazardous materials, sedimentation/erosion, and watercraft wastes.

7. Technological developments will continue to affect the need for more training.(a) New water pollution control equipment and processes

for municipal operations in conjunction with effluent limitations through state "permit" programs will dictate a higher caliber operator for the treatment system. (b) Surveillance technology will introduce automated sampling, chemical analysis procedures and more complex instrumentation for water analysis. (c) Management in state and local governments will be required to be aware of technological improvements and alternative solutions to achieve improved water quality.

8. The EPA Direct Technical Training Program presently provides a wide variety of activities to fill the technology gap. Increased skill and knowledge requirements of personnel at all levels of federal, state and local government, industry and education resulting from new legislative mandates, dictate an intensified technical training effort.

PART II. MANPOWER AND TRAINING DETERMINATIONS

These data have been extracted from the EPA Report to Congress, Number 92-36, March 1972, and are to be considered as estimates, which are conservative in view of the recent water quality legislative requirements under Public Law 92-500. Despite certain data limitations discussed in the 1972 report, however, the forecasts are considered indicative of the order of magnitude of the manpower and training needs since some consideration was given to proposed legislation at that time. Future potential changes to these data resulting from further analysis of the impact of the 1972 Water Act Amendments and new assessment information will be outlined in the text of the report that follows.

Water quality personnel with a wide variety of skills are needed to perform these functions. For purposes of this report, they are categorized into four overall groups: professionals, technicians, operators, and others.

1. Professionals

Into the professional category fall those jobs that require creative problem-solving; the professional is expected to deal with analysis and correction of unusual management or technical problems.

Sanitary engineers are the predominant professionals in the field. The professional category also includes civil, electrical, and mechanical engineers and architects who design and construct facilities, chemical engineers who design and modify treatment processes, and mechanical and electrical engineers who design and operate the electrical and materials handling systems in the larger wastewater treatment facilities and the sewage collection systems.

In addition to engineers the professional category includes scientists who are involved in research, monitoring, and technical supervision. Chemists and microbiologists engage in water analysis in facilities and in streams, while aquatic biologists analyze the effects of pollution on water life.

Recently, as the interdisciplinary impact of water pollution control has become more apparent, other professionals have become more closely identified with the field. For example, lawyers, economists, and political scientists are frequently involved in enacting and administering water quality legislation, and management specialists and computer specialists have joined with engineers and scientists to provide interdisciplinary teams to solve water quality problems.

2. Technicians

The technician performs complex but routine analytical tasks which require a knowledge of engineering and/or scientific techniques. This category consists largely of wastewater treatment laboratory technicians who perform chemical and biological tests to analyze influents, treatment processes, and effluent characteristics. Particularly large or sophisticated water and/or sewage utilities also utilize electronic technicians to work with telemetry and automated control systems. Other technician level personnel include the draftsmen and survey party personnel who work with the consulting engineering firms and large municipal departments.

3. Operators

The operator manpower category includes several levels of personnel who are directly responsible for operation of equipment and systems involved in treating wastewater. The lowest grade of operator is an entry-level job. These operators may have less than a high school education and may have little mechanical experience.

The second grade of operators include those who are more experienced and are responsible for operations of part of the plant, or possibly a small plant in its entirety, including the indoctrination of new operators.

The third level of operator includes supervisory personnel such

as shift supervisors and plant superintendents who have ultimate operating responsibility for effectively running a plant.

4. Others

Other categories include the craftsmen (such as electricians, mechanics, and machinists) who are required for maintenance of wastewater treatment plants; the laborers who support the operators and craftsmen; and clerical and administrative personnel.

Although the nature of plant operations gives maintenance jobs a number of unique characteristics, personnel fulfilling the maintenance function generally require standard craft skills. Heavy equipment operators, mechanics, and bricklayers are needed for sewer collection system operation and maintenance.

EXHIBIT I

MANPOWER ENGAGED IN WATER QUALITY ACTIVITIES - FY 71

SECTORS

PERSONNEL CATEGORY	NON-GOVERNMENTAL	LOCAL	STATE	FEDERAL*	TOTAL
Professional	13,200	4,300	2,100	5,800	25,400
Operator	15,400	29,700	-	4,200	49,300
Technician	20,500	4,000	300	2,100	26,900
Other	4,700	38,700	1,200	3,200	47,800
TOTAL	53,800	76,700	3,600	15,300	149,400

Source: A Report to Congress in Water Pollution Control Manpower Development & Training Activities, (March 1972 - Page 76)
*Federal EPA and Federal Non-EPA have been combined for the purposes of this report.

EXHIBIT II

MANPOWER PROJECTED IN WATER QUALITY ACTIVITIES - FY 76

SECTORS

PERSONNEL CATEGORY	NON-GOVERNMENTAL	LOCAL	STATE	FEDERAL	TOTAL
Professional	23,400	5,600	5,500	7,700	42,200
Operator	48,700	38,600	-	5,600	92,900
Technician	38,900	5,200	700	2,500	47,300
Other	15,100	50,400	2,100	4,200	71,800
TOTAL	126,100	99,800	8,300	20,000	254,200

Source: Ibid., p.77

EXHIBIT III

MINIMUM ADDITIONAL MANPOWER REQUIRED BY FY 76

SECTOR

PERSONNEL CATEGORY	NON-GOVERNMENTAL	LOCAL	STATE	FEDERAL	TOTAL
Professional	10,200	1,300	3,400	1,900	16,800
Operator	33,300	8,900	-	1,400	43,600
Technician	18,400	1,200	400	400	20,400
Other	10,400	11,700	800	1,000	23,900
TOTAL	72,300	23,100	4,600	4,700	104,700

Source: Ibid., p.5.

EXHIBIT IV

LABOR FORCE GROWTH BY FY 76

PERSONNEL CATEGORY	1971 MANPOWER ENGAGED	1976 MANPOWER REQUIREMENTS	%INCREASE
Professional	25,400	42,200	66%
Operator	49,300	92,900	88%
Technician	26,900	47,300	77%
Other	47,800	71,800	50%
TOTAL	149,400	254,200	70%

Source: Ibid., p.5.

EXHIBIT V

FORECASTED TRAINING REQUIREMENTS-AVERAGE ANNUAL LOAD

SECTOR

PERSONNEL CATEGORY	NON-GOVERNMENTAL		LOCAL		STATE		FEDERAL		TOTAL	
	ENTRY	UPDATE	ENTRY	UPDATE	ENTRY	UPDATE	ENTRY	UPDATE	ENTRY	UPDATE
Professional	2,960	9,140	500	2,480	880	1,920	680	3,900	5,020	17,440
Operator	8,260	16,020	3,480	17,080	-	-	520	2,460	12,260	35.560
Technician	5,160	14,860	480	2,300	100	260	180	1,240	5,920	18,660
Other	2,580	3,280	400	1,260	-	-	240	280	3,220	4,820
TOTAL	18,960	43,300	4,860	23,180	980	2,180	1,620	7,880	26,520	76,480

Source: Ibid., p.5.

PART III. MANPOWER ANALYSIS

A. PURPOSE AND SCOPE

The purpose of this section is to provide additional information and rationale relative to current and new manpower considerations resulting from Public Law 92-500 and results of education and training efforts by EPA.

B. APPROACH

It is concluded that implementation of the Water Pollution Control Act Amendments of 1972 will require more and better trained people. The legislation provides a large increase in the funds available for the construction of new and upgrading of existing municipal wastewater treatment facilities. New planning approaches will be required for state-wide water quality planning, area systems for waste treatment, and water quality surveillance. Implementation of the National Pollutant Discharge Elimination System adds new regulatory responsibilities to EPA and to state agencies which have programs approved by EPA. This will require new capabilities not only in the public agencies but also in the private organizations who must comply with the new law. Also increased attention will be given to non-point sources of pollution such as erosion, agricultural wastes, mine drainage and runoffs from urban areas. All these new activities will need to be carried out with new and constantly improving technology and institutional arrangements.

EPA intends to meet its manpower responsibilities primarily in collaboration with the Federal and State educational and labor agencies which have primary responsibility for manpower development.

Additionally, to deal with the manpower factors of the program, the new Federal Water Pollution Control Act continues the authorization for EPA to conduct a broad range of training programs and to establish a system, in cooperation with other public and private organizations, for forecasting manpower. In this regard, the EPA strategy is to have state and local water pollution control agencies define the manpower and training needs of their jurisdictions and meet these needs primarily through their established educational institutions. EPA, in cooperation with the state environmental agencies, will strive to fill training gaps that exist while exploring new training concepts. Also, EPA will develop materials and programs centrally for state and local application and provide technical assistance to state and local manpower training efforts to assure adequate performance. Further, under Subsection 109(b) of the new legislation, EPA is authorized to provide up to $250,000 per state for the construction of a facility for training of waste treatment operation and maintenance personnel. This effort will take on increasing significance in assisting states to meet their manpower and training needs.

To assist in accomplishment of the manpower program, EPA is endeavoring to have a manpower planning capability established in the water pollution control agency of each major metropolitan area and each state and territory. This manpower planning activity will assist state training personnel in determining the manpower needs in water

pollution control activities of their jurisdictions, and then with counterpart manpower planning councils of the mayor, governor, or planning area the education agency plan programs to meet these needs.

This strategy, in line with the President's decentralization policy, is directed to establishing responsibilities and capabilities at the local level. The EPA role in this regard, in addition to providing assistance in the establishment of the capabilities, involves doing things that can best be done centrally; e.g., develop the manpower planning methods and tools, and training curricula and demonstration training programs, that can be adapted to the needs of individual jurisdictions.

EPA will continue to work with those federal agencies which have primary manpower responsibilities such as the U.S. Department of Labor and U.S. Office of Education, and with them, develop programs to meet mutual objectives. Additionally, EPA also recognizes the contributions that can be made by the members and staffs of the professional and employer associations of the water field - principally, the Water Pollution Control Federation, American Water Works Association, Consulting Engineers Council, and the Water and Wastewater Manufacturers Associations. EPA is continuing to effect communications at all levels which will draw upon the capabilities of their members and meet mutual needs.

C. FEDERAL-STATE-LOCAL MANPOWER PLANNING SYSTEM

EPA continues to carry out a comprehensive program to develop the tools and to implement the system for cooperative manpower planning described in Section B above and Part II of the 1972 Manpower Report to Congress.

Occupational definitions and staffing guides have been developed for the management, operations and maintenance functions of wastewater treatment plants in the 0-1 million gallons per day (MGD) range and also the 1-25 MGD and 1-100 ranges. Additionally, occupation and manpower requirement information has been completed for wastewater collection systems in cities and towns from 1,000 to 150,000 in population, and a second manual for cities up through 500,000 in population is nearing completion. Thousands of copies of these manuals have been disseminated to state and local water pollution control agencies, educational institutions and consulting engineering firms, among others.

Projects have been completed relative to the development of manpower planning criteria for state water pollution control agencies. They include demonstration pilot studies in Ohio and Indiana and an initial national effort by EPA. Additional developmental work will be required for the validation of planning criteria relative to state water pollution control functions.

The U.S. Office of Education (HEW), recently funded a project in cooperation with EPA, the American Water Works Association, and the Oklahoma Vocational Education Agency for the development of manpower planning criteria for water supply facilities. Also included in this effort will be materials and information relative to curriculum and training program parameters.

A number of actions have been taken to develop and implement the cooperative manpower planning system. In FY-72 a manual "Manpower Planning for Wastewater Treatment Plants" was published and disseminated. This provides specific guidance on how to obtain, compile and analyze data

and to forecast manpower and training needs. It also provides guidance on planning, recruiting and training programs and actions to improve employee retention and productivity. Included in this effort is a current project at North Carolina A&T State University relative to personnel management practices in wastewater collection systems. In FY-73, the manual was expanded into a training manual and in FY-74, a similar manual applicable to the total water quality field is to be produced.

In 1972, orientation in the need for and methods of manpower planning was given to 200 representatives of federal, state and local water pollution control, education and labor agencies. In 1973, one-week training courses and one-day orientation conferences were attended by 180 representatives of these agencies. As a result of these efforts over 30 state water pollution control agencies have assigned either a part-time or full-time employee to the manpower planning function. Eight additional states are in the process of establishing this capability. EPA has initiated several demonstration grants for the establishment of state manpower planning activities. Also, EPA is presently working with the State of South Carolina to develop and install a computerized municipal facilities and manpower information system.

The U.S. Office of Education is providing technical and financial support for the EPA manpower planning efforts. The Department of Labor is also supporting this effort. A "Cooperative Area Manpower Planning Issuance" explains the objectives of the EPA program to Governor's

and Mayor's Manpower Planning Councils and solicits their support. Occupation definitions are being developed with support of DOL Field Centers. Also, linkage has been established with the Intergovernmental Personnel Program of the Civil Service Commission.

Last year a nationwide manpower survey of municipal wastewater treatment plants was completed by the DOL-Manpower Administration (MA) and the EPA. Data collected by the MA-affiliated State Employment Security Agencies from more than 90% of the 3,500 plants surveyed in this project, tend to verify most of the conclusions and projections outlined in the 1972 Report to Congress. Although the findings of this survey are now somewhat obsolete at this time in light of numerous new state and local requirements outlined in P.L. 92-500 it still represents a cornerstone in the federal survey effort.

Other surveys completed or currently under development include: A National Survey of Manpower Utilization and Future Needs in Water Pollution Control (complete); Manpower Needs of Equipment Manufacturers conducted by the Water and Wastewater Equipment Manufacturers Association (partial results available for this report); an Initial Study of Private Industrial Manpower Needs (results partially available).

As explained in Part III of the 1972 Manpower Report, EPA is also concerned with manpower recruitment, retention and utilization. Efforts in this area have concentrated on improvement of operator certification practices of state agencies. EPA, with support of the American Water Works Association and the Water Pollution Control Federation,

made the following accomplishments in this area: (1) a Model State Law was developed and promulgated by the Council of State Governments; (2) a national certification authority (Association of Boards of Certification (ABC)) to promote improved and consistent certification practices among state agencies has been established; and (3) a body of guidelines for the administration and evaluation of state certification programs was developed and issued; (4) a classification system for water and wastewater personnel and facilities is currently under development by ABC under a grant by EPA.

To provide a basis for promoting productivity improvement in wastewater facilities, a study was completed in FY-73 on the application of industrial engineering techniques to facility design and operation.

In FY-74 a project will be undertaken to identify and develop solutions for problems encountered by small communities in recruiting and retaining qualified workers for their wastewater facilities. This will also address the need to ensure fair employment opportunities in this expanding area of employment.

D. MANPOWER OVERVIEW

The manpower available for implementing the new legislation can be readily characterized under the general occupational categories of (1) professional (which includes engineers and scientists), (2) operators, (3) technicians, and (4) others which includes maintenance

personnel and related blue collar and general administrative types. New entry employment opportunities in water pollution control are expected to exceed the 1972 estimates over the next several years. The original estimates were 5,000 per year for professionals, 8,700 per year for operators, 4,000 per year for technicians, and 4,700 for other occupations.[1] An increase in sources of supply, on the other hand, does not seem likely to occur.

Professionals - The current annual supply of qualified personnel from external sources will not adequately cover the total manpower demand. Professional hiring will come from related fields in all sectors (government and non-government) and graduate training programs of universities will supply approximately 2,000[2] specialized graduates per year under a multitude of engineering and scientific disciplines for the water pollution control field. Undergraduate programs will provide a very nominal number (perhaps as few as a few hundred) of "specialized" graduates for water pollution control, who can take on professional level assignments initially. Of course, various types of non-environmental degrees will fill positions which are available in order to help take up some of the slack that exists. Additionally, vocational education schools with two-year programs provide for a limited number of personnel entering the professional ranks who are fully qualified. These non-specialized personnel acquire the necessary additional skill and knowledge requirements through additional training (formal or informal) provided by their employer and others.

Care must be shown in placing these individuals to ascertain that

[1] Ibid., p.5

[2] EPA Office of Water Programs Academic Training Analysis Report (1973).

their performance ability is of high enough caliber to meet operating criteria. It is worth noting that the conferees on Environmental Education at Drexel University (August 1973) gave tentative approval to less than professional level education, recognizing the need for added trained personnel. Where professionally trained personnelare not available, pollution control activities are making use of lesser trained individuals, with an apparent resulting loss of efficiency in pollution abatement and control.

Operators, Technicians and Maintenance Personnel - EPA-sponsored programs are currently providing training for between 1,000 - 2,000[3] new entry personnel and 5,000 - 7,000[4] upgrade and update category personnel annually for the operation and maintenance of wastewater treatment plants, mostly at the local level. Similarly, upgrade and update training for technicians numbersat about 800 - 1,200[5] annually. The actual new entry need for operators, technicians and maintenance personnel still far exceeds this entry training provision. Most new entry personnel are drawn from the general labor market. They have little or no previous experience in related activities,yet do possess some demonstrated ability. Others from the labor market have related

3,4,5 EPA Office of Water Programs, Manpower Development Staff Summary Analysis: 1971-73.

skills or are untrained people who receive hands-on experience through on-the-job training; numerous positions though remain vacant and are not filled.

E. SUPPLY AND DEMAND

The water pollution control manpower universe can be divided into sectors for the purposes of analyzing their manpower and training situations. These sectors are: (1) non-governmental; (2) local government; (3) state government; and (4) federal government.

1. Non-governmental

a. Industrial - Industrial firms can be expected to represent one of the largest consumers of the current available manpower -- an increase of over 100,000[6] over the next 3-5 years. The increase can be directly attributed to the water pollution control legislative provisions outlined

[6] Study by Dr. J. Middlebrooks, Utah State University - Sept. 1973.

under Part I.C. of this report. The demand will cut across all occupational categories (professional engineers and scientists, treatment plant operators, laboratory technicians and maintenance personnel), but plant operators and technicians represent the greatest demand. Professional staffs will be involved with more complex treatment plant process selection, plant design, supervision, analysis of industrial effluents and coordination with municipal utilities to negotiate pretreatment processes and municipal treatment charges for wastewater discharged into the municipal sewer system. Operators will assume increased responsibility for the operation and maintenance of the increasing number of types of treatment facilities, while laboratory personnel will be employed to analyze the effluent and monitor its quality through various processes to the discharge point. As previously pointed out, industrial concerns discharging wastes into a receiving waterway, will be issued "permits" either by EPA or the state all in conformance with effluent limitations guidelines. Industrial organizations will be responsible to see that these effluent limitations are maintained.

The most significant difference from the projections made in the 1972 Report to Congress is that there is a much greater number of people presently employed by industry in water pollution control activities.[7]

However, careful examination of the data obtained in an EPA survey of 10,000 industries[8] indicates that although the total number of employees engaged in water pollution control may have been underestimated, the number of full-time-equivalent employees may not be in error to any

[7,8] Ibid.

significant degree. The majority of the companies reporting the percent of effort for the various personnel indicated an average of less than one-eighth of their time was devoted to water pollution control. When the totals are reduced to full-time equivalents and the number of industries that were not included in the 1972 Report are considered, the results indicate reasonable agreement between the two estimates.

The 1973-76 period will witness a continuation of the current trend of using personnel actively engaged in some other production process of the industry to supervise the personnel conducting industrial wastewater treatment operations. Therefore, the increase in professional personnel will be largely in process functions, and people now devoting a small portion of their time to handling water quality responsibilities will allocate more time to wastewater concerns. While the professionals hired into the industrial wastewater treatment positions will require training specifically focused on water concerns, because their responsibilities in training have been process-oriented, little increased burden from this sector is expected on those educational institutions that now educate environmental engineers. Rather it is reasonable to expect that educational institutions will utilize an increasing portion of their resources to deliver specialized short courses to accommodate the needs of new industrial entrants and others in need of similar training.

In light of these considerations, it appears that industrial employers of water quality personnel will experience sizable increased need for trained personnel in the 1973-76 period and that the nature of training delivered will increase in technological sophistication at all levels. Estimates of the average annual industrial water quality training load needed to maintain progress in the efforts to control water pollution are

expected to remain basically as projected in the 1972 Report to Congress.

b. Educational Institutions - Manpower employed by educational institutions consists almost entirely of engineers, scientists, and technicians who perform activities in teaching, research, curriculum planning, and advisory consulting to government agencies and consulting engineering firms. The ratio of technicians to professionals in this subsector is approximately two to one, and the total number of technicians employed in these institutions is under 1,000[9]. Most technicians hold bachelor's degrees and are responsible to collect data and conduct laboratory experiments in research areas, and few technicians teach. A number of graduate students also serve as teaching fellows and research fellows, but they are not included in the educational water quality manpower inventory because they are still active students. The current inventory of professionals in this area is estimated to be approximately 700.[10]

It is estimated that educational institutions are now operating at two-thirds of their capacity to produce trained professionals and that they would be able to produce 50 percent more if the job openings existed to create the educational demand. However, utilization of this capacity would necessitate a major diversion of current staff from research to teaching--which is, of course, unrealistic. The true expansion factor for the production of trained professionals using only the existing teaching force is therefore something less than a 50 percent increase.

9, 10 Ibid.

For this reason, educational institution manpower in water quality is expected to experience little change between 1972 and 1976.

Training needs for personnel employed by educational institutions are not enumerated, but this should not be interpreted to mean that they do not require additional training. If an instructor is to remain current in his specialty area and possess enough general knowledge to produce well rounded professionals and technicians for practice, it is essential that he devote at least one of every 5 to 6 years of his career to additional study at another institution or research laboratory.

c. Manufacturers of Wastewater Analysis and Treatment Equipment and Chemicals - The wastewater equipment and chemical suppliers represent the most diverse groups that employ professional and technical water pollution control personnel. Services provided by this group range from turn-key type operations, which provide everything required from a completed treatment facility to the sale of chemicals. The professionals performing the various functions possess all types of academic backgrounds, and it would be essentially impossible to use a general classification scheme for the entire industry.

As part of the overall evaluation of manpower needs in the environmental field, a survey of water and wastewater equipment manufacturers and suppliers is being conducted jointly by the Water and Wastewater Equipment Manufacturers Association (WWEMA) and the EPA. A questionnaire has been mailed to approximately 280 members of the WWEMA.

In certain employee categories, significant increases are anticipated, while figures in other categories indicate little change over those reported in our 1972 Report to Congress. In general, however, it appears that a significant increase in

manpower requirements will occur in the employee categories traditionally employed by equipment and supply firms.[11]

The anticipated training needs for equipment manufacturing personnel in the professional and technician categories are somewhat higher than originally estimated. Approximately 10 percent are expected to require long term advanced training over the next several years. The majority of this training will be received in residence at universities. A larger percentage are expected to require short term training, portions of which will be provided by universities in extension courses and workshops. Probably a majority of the short term training required in the equipment area will be conducted by the industries own training staff.

d. Consulting Engineers in Design and Operations - Consulting engineering organizations represent one of the major types of employers of water pollution control specialists. Water quality personnel employed by such firms engage in such activities as water resources planning, preliminary engineering studies, feasibility and economic studies, process selection and evaluation, preparation of plans and specifications, construction administration, resident engineering supervision, plant start-up and consultation, and monitoring of systems. In the smaller engineering firms, a staff of two or three professionals are involved in all of these activities, while larger firms will be more specialized, with professionals who are involved in only segments of a project and a senior engineer assigned the task of coordinating the various phases.

[11] Ibid.

A substantial growth rate is anticipated for all categories of technical and professional employees in the consulting industry. All categories are expected to double[12] in numbers by 1976 if the anticipated growth occurs, and there is little doubt that expenditures will necessarily increase significantly in order to meet water quality standards.

Even without an increase in industrial expenditures, all professional categories will experience approximately a 70 percent increase in manpower utilization by the consulting industry. The current manpower inventory of consulting engineering firms has been calculated from a study recently completed for EPA. The following pertinent information applies:

(1) There are approximately 1,200[13] consulting engineering firms engaged in water pollution control with four employees or more;

(2) Professionals employed in the consulting engineering field will increase from a total of approximately 13,500 to over 28,000 by the end of 1976[14] which is a sizable increase over 1972 estimates. (Based on annual expenditure of approximately 3 billion per year for the next 3 years);

(3) Technicians employed by consulting engineering firms are expected to increase from approximately 11,000 to over 22,000[15] by the end of FY 1976 which is also a significant increase from our original estimates.

(4) The requirements for chemical and other types of engineers and professionals can in all probability be met from the existing and forecasted manpower pool. However, the need for sanitary engineers and environmental engineers can only be met by drawing from the very limited source of supply.

12, 13, 14, 15 Ibid.

(5) On a national basis, it is projected that approximately 4,500[16] professionals and 2,500[17] technicians employed in the consulting engineering industry should attend short-term training - 3 days or less - over the next three years to remain current and 3,300[18] professional and 1,500[19] technicians should be enrolled in long-term programs of a week or more. Failure of the private sector to implement training may have an adverse effect on personnel competence and manpower supply.

The above results indicate that a significant number of short-term programs will be needed to satisfy the need for refresher courses. The existing academic programs are probably adequate to provide the long-term program, but a more concerted effort on a regional or state level will probably be required to satisfy the need for short-term programs. The consulting industry represents only a small percentage of the total number of people employed in the water pollution control field, and based on the need for additional training in the consulting industry, it seems reasonable to assume that the total need for additional training will far exceed the totals projected for consulting. It is estimated that the training needs of consulting firms represents less than 5 percent of the total that have similar needs and are employed in the water pollution control field. Based on the results of this study it would seem that a significant demand exists for well-organized, short term, continuing education courses.

16, 17, 18, 19 Ibid.

2. Local Government Sector

A vast majority of the approximately 13,000[20] communities in this country have wastewater collection systems either with or without wastewater treatment plants and the latest data indicate that there are nearly 21,000[21] municipal wastewater treatment plants in operation with another 4,000+[22] on the drawing boards, and another 370[23] currently being built. Plants range in size from the very small employing a few people, to the very large employing hundreds. Current EPA inventory information shows the following breakdown of plants:

(Million Gallons Per Day)	MGD	NUMBER
	0-1	18,050
	1-5	2,170
	5-10	355
	10-25	225
	25+	150
	Total	20,950[24]

Local government will share significant responsibilities in assuring water quality in treatment plant operation and as partners with the State Government in implementing their portion of the water quality plan with adjoining communities. Manpower estimates from the 1972 Report to Congress remain valid although quite conservative (a recent analysis of wastewater collection systems,for example,shows an original under-estimation of current employment and needs by a factor of 2.)[25]

20 A Report to Congress in Water Pollution Control Manpower Development and Training Activities, March 1972, p.57.

21, 22, 23, 24 EPA Storet Data Inventory File, Sept. 1973.

25 Manpower Requirements for Wastewater Collection Systems, N.C.A.&T. State University, July, 1973.

As indicated in the 1972 Report, local employment will reach in excess of 100,000[26] by the end of 1976 from a base of approximately 80,000[27] today (perhaps 30% more predicated on the new legislation). Wastewater treatment operation and maintenance personnel remain the most critical occupation and there will be increased demand placed on this occupation category from private industry and other sectors.

Update and entry level training requirements remain as previously estimated for the 1972 report, which is considered conservative: that is a total annual training need for 4,900[28] new entry level personnel and for updating 23,200[29] plant operation personnel represent 75% of this training load. As previously stated, EPA assistance in training activities only partially fills the current demand. There are other sources of training assistance including the local governments. Assistance for training from local governments is likely to grow. Local governments should have increased revenues for operations and maintenance pursuant to EPA requirements that users be charged for sewage treatment services.

3. The State Sector

The manpower requirements of state agencies, in order to properly implement, monitor and control the various water pollution control programs, required by the new Federal legislation basically parallel the needs portrayed in our 1972 Report to Congress since the state role in implementing new water pollution control legislation was anticipated. Strong management will be required to properly implement their programs. Additional expertise is required from external sources, particularly in the professional area. Orientations and specialized training programs throughout the states are required to assure program success.

26, 27 A Report to Congress in Water Pollution Control Manpower Development and Training Activities, March 1972, p. 58

28, 29 Ibid. p.61

Planning demands imposed by the new legislation require experienced individuals. Planners have not previously been employed to any significant extent in many of the state water pollution control agencies. Planners may be found to a extent in other state agencies, particularly state planning departments. Other major functions being expanded include: surveillance and monitoring, inspection, certification; training and programs relative to pollution resulting from feed lots, mine drainage, oil field brine, etc. Major changes in planning for water pollution control facilities are associated with metropolitan/basin plans and with the administration of a "permit" program. Changes in other programs involve mainly the certification of operators, the training of operators in operation and maintenance methods and technician requirements for water analysis surveillance and monitoring. A review of the FY 74 submission of state program plans to EPA from all states indicates a planned manpower level in excess of 5,000;[30] up from 3,600[31] this year (anticipated growth to over 8,000[32] by the end of FY 76). The expected FY 74 state increases are most significant in the functions of, "Permit Application and Compliance" and "Planning and Water Quality Standards." A coordinated effort to train state agency personnel is needed.

Current training needs for entry professional and technician personnel are estimated at conservatively 1,000[33] per year and update training for over 2,100[34] annually which is consistent with the 1972 Report. However, new water analysis reporting requirements under the National Pollution Discharge Elimination System indicates, as a result of determinations made in a four-state study in EPA Region VII, indicates a need for Water Analysis Testing Techniques and Procedures training for 2,000[35] operators,

30, 31 EPA OWPO MDS Summary Analysis, Sept. 1973.

32 Report to Congress, op. cit., p. 64

33, 34 Ibid, p.65

35 EPA Region VII Manpower Analysis, 6/73.

technicians, and supervisory personnel that as many as 25,000 need to be trained on a national basis. This was not projected in the 1972 estimated training needs in our previous report to Congress.

4. Federal Government Sector

The Environmental Protection Agency is the lead agency in the Federal Government's program for water pollution research, abatement, and control. The Office of Air and Water Programs of EPA is primarily responsible for ensuring a coordinated and effective federal effort to protect and enhance the quality of the nation's water resources. The manpower resource of EPA pertaining to water pollution control has grown to approximately 3,000.[36] Relative to training, over the next several years update training of agency employees should be at a rate of approximately 1,000[37] per year/and 400[38] per year for personnel entering the agency. Both update and entry level training is necessitated by the rapid growth and changes in the EPA Water Quality Program and the improvements in technology. Training needs will be partially satisfied through the Agency's Direct Technical Training programs.

Other federal agencies are required to strengthen their water pollution abatement and control efforts in that all federal activities are required to adhere to the same water quality standards and effluent limitations imposed on private industry, the states and municipalities.

Data from the 1972 Report to Congress remains usable. There are over 12,500[39] professional, technical, operator and maintenance personnel

[36] Report to Congress, op. cit., p. 73.

[37, 38] Ibid, p. 74.

[39] Ibid, p. 75.

involved in water pollution activities in non-EPA federal organizations. The imposition of more stringent requirements will necessitate an increase to at least 15,800[40] over the next few years in order to keep their activities up with the latest water quality requirements. Further study on the total impact of the new legislation is needed in this sector. Training required will be in all occupational categories (operator training being the greatest) to ensure that personnel are aware of the most current technological advances, that they adhere to the latest requirements, and that they observe proper operations and maintenance procedures relative to wastewater treatment and collection. There are approximately 9,000[41] waste treatment plants in the federal system. However, a vast majority, well over 50%, are plants of very small size requiring only one part-time operator. Nonetheless, operator training needs conservatively should be required to average over 500[42] for entry level per year and update training of 2,500[43] annually. All other occupational categories should require entry level training for 700[44] per year and over 3,500[45] update training.

In sum, total water pollution abatement and control manpower training requirements are projected to rise over the estimated requirements cited in the 1972 Report to the Congress as a result of the implementation of the Federal Water Pollution Control Act Amendments of 1972. Increases will be experienced in all job categories with the greatest numbers of trained personnel needed in wastewater treatment and related functions. As examples, industrial operations will be governed by a

40 Ibid, p. 68,

41 Ibid, p. 203

42,43,44,45 Ibid, p. 70

"permit" to assure water quality and in most instances will require pretreatment of industrial wastes prior to release into municipal collection systems; manufacturers of wastewater equipment and chemicals, supported by consulting engineers, will expand their businesses as a result of the significant Federal expenditures for the construction of wastewater collection systems and treatment facilities; Government environmental and related agencies at the federal, state and local levels will significantly expand their manpower resource efforts to develop programs and action plans in order to implement the numerous water quality legislative requirements.

IV. TRAINING PROGRAMS

A. GENERAL

The EPA strategy for developing effective and comprehensive approaches to training relates to the essential ingredients of any manpower training program; requisite educational capacity, information, and financial support. Once a need has been identified, capacities must be identified or developed and supported in order to respond to that need. It is EPA's policy to work within the existing institutional framework and develop and encourage the use of new mechanisms for the delivery of training at the point closest to the source of the need. EPA strategy is to help build this capacity and to supplement rather than supplant the activities of others.

In implementing this strategy and in supplementing the roles of others, EPA has focused its programs to: (1) support universities and individual students mainly at the graduate levels in programs leading to professional careers in water pollution control; (2) provide a continuous training mechanism for updating these and other personnel, to provide them with the results of technological advancements in the field; (3) expand the coverage of programs of other federal agencies to channel their resources more effectively to the manpower and training needs in water pollution control; (4) strengthen the capacities and capabilities of the states and two-year educational institutions to help provide an adequately

trained core of treatment plant operators and water pollution control technicians.

In shaping its training programs, EPA's Office of Water Program Operations is attempting to help satisfy the unmet needs of the professionals and the operators and technicians who constitute the existing or potential manpower who are required to control water pollution. The EPA's activities in water pollution control training are described in this section of the supplemental report.

B. PROFESSIONAL TRAINING GRANTS FOR GRADUATE PROGRAMS

Pursuant to Subsection 104(g)(3)(A)) of the Act, (formerly 5(g)(3)(A)), EPA awards professional training grants to institutions for the establishment, expansion and improvement of graduate level programs in water pollution control. This program is intended to produce a cadre of professionals trained to contribute to water quality management through subsequent positions in research, consulting or direct operations in the public or private sectors. Renewable grants are awarded for one year at a time as part of a training project of five years duration. Grant funds primarily are used for student stipends as well as when needed to expand and improve staff facilities and equipment and for the development of curriculum.

Under these grants training has been provided in the following disciplines:

1. Environmental Engineering
2. Sanitary and Public Health Engineering

3. Environmental Chemical Engineering
4. Environmental Systems Engineering
5. Agricultural and Environmental Engineering
6. Environmental Mining Engineering
7. Soils Environmental Engineering
8. Environmental Biology
9. Limnology and Aquatic Biology
10. Estuarine, Biological, Physical and Chemical Oceanology
11. Physical Sciences
12. Interdisciplinary Environmental Programs
13. Social and Political Science Programs
14. Course and Project Development

Into the professional category fall those jobs that require creative problem solving ability; the professional is expected to deal with analysis and correction of unusual management or technical problems. Environmental and Sanitary Engineers are predominant professionals in the field. In addition to their engineering training they are schooled in life and physical sciences and are commonly employed as planners, designers, administrators or facility managers. The professional category also includes civil, electrical and mechanical engineers and architects who design and construct facilities, chemical engineers who design and modify operations and treatment processes, mechanical and electrical engineers who design and operate the electrical and materials

handling systems in the larger wastewater treatment facilities and the sewage collection systems. As a result of experience and continuing education, these engineers frequently become specialists in water pollution control activities.

In addition to engineers the professional category includes scientists who are involved in research, monitoring and technical supervision. Chemists and microbiologists engage in water analysis in treatment facilities and other water sources while aquatic biologists analyze the effects of pollution on water life. These scientists assist in the design and analysis of waste treatment processes and water quality measurement systems.

Over the years these programs largely have been responsible for the reservoir of scientific and engineering manpower now available in the water pollution control field. Indeed, most of the graduate level programs related to water pollution control have been supported by EPA at one time or another. This support has been specifically oriented to water pollution control as opposed to the more general orientation of support from other federal agencies.

Recent and projected professional training grants program activities are summarized as follows:

EXHIBIT VI

RECENT AND PLANNED PROFESSIONAL TRAINING GRANTS PROGRAM ACTIVITIES

	ACADEMIC YEAR				
	1970-71	1971-72	1972-73	1973-74	1974-75
Number of Trainees Authorized	788	932	1241	845	640
Number of Professional Training Grants	88	91	102	74	52
Number of States Involved	43	43	43	40	33
Number of Institutions Involved	72	82	92	69	48
Funds Awarded	$3,781,756	$4,562,682	$4,701,679	$3,181,890	$2,950,000

C. RESEARCH FELLOWSHIPS

Pursuant to Subsection 104(g)(3)(B)) of the Act, (formerly 5(g)(3)(B)), EPA has awarded fellowships to students for selected specialized training in water pollution control. The purpose of this program is to increase the number and competence of engineers and scientists qualified to conduct independent study and advanced practice at the graduate level. Awards are made on a competitive basis primarily to doctoral candidates in engineering, physical sciences, and biological sciences of socio-economic disciplines. Applicants for this program have been reviewed with the objective of selecting only the most promising students. The Research Fellowship Program has been viewed as the primary source of instructors for university training of professionals and the primary mechanism for building the capacity of research and training for professionals.

Recent evaluation of the production from the Research Fellowship Program has led EPA to phase out this program and initiate a program designed to augment and improve the caliber of professional personnel working for state and local water pollution control agencies. It has become apparent during the past few years that the supply of professionals in teaching, research, and in specialty levels is approaching saturation and that the need for federal support for research fellowships at this level should be eliminated. Concomitantly, the need for better qualified and more

highly skilled professionals at the state and local agency level, has become more critical. Fellows will be selected from prospective or actual employees of state and local agencies as a means of improving those agencies' role in environmental protection. Therefore, under the same authorization as the Research Fellowship Program a new Fellowship Program, having a great impact on meeting Federal clean water goals is being initiated.

Recent activities under the Research Fellowship Program are as follows:

EXHIBIT VII

RECENT RESEARCH FELLOWSHIP PROGRAM ACTIVITIES

	ACADEMIC YEAR				
	1970-71	1971-72	1972-73	1973-74	1974-75
New Research Fellowships Authorized	60	46	31	0	0
Total Research Fellowships Awarded	105	108	70	21	0
Number of Active Fellows	149	161	103	21	0
Number of States Involved	29	27	27	12	0
Number of Institutions Involved	51	58	29	12	0
Funds Awarded	$600,000	$600,000	$461,003	$135,900	0

D. TECHNICAL TRAINING GRANTS AND SCHOLARSHIPS FOR UNDERGRADUATE STUDY

Section 109 (formerly Section 16) authorizes the award of grants to or contracts with institutions of higher education -- to assist them in planning and developing, strengthening, improving or carrying out programs or projects for the preparation of undergraduates to enter an occupation which involves the design, operation and maintenance of treatment works and other facilities whose purpose is water quality control.

The objectives of this section are: (1) to plan, develop or expand training programs at this level; (2) to train and retrain faculty; (3) to support innovative and experimental programs of cooperative education; (4) to develop and research materials to plan curriculum.

Section 111 (formerly Section 18) authorizes the award of "Scholarships for Undergraduate Study by Persons Who Plan to Enter an Occupation Involving the Operation and Maintenance of Treatment Works".

Three areas of training have been addressed under Section 111: (1) training of qualified high school students at two-year institutions in the operation and maintenance of waste treatment and related facilities; (2) improvement of the training of junior and senior bachelor's degree engineering students in the design of waste treatment facilities at four-year colleges; (3) short-term institutes for training of undergraduate faculty in water pollution control.

Three institutions (Charles County Community College, Linn-Benton Community College, and the Greenville Technical Education Center) have completed development of program curricula based on the guidelines prepared by Clemson University and have opened their degree programs in wastewater technology training. Curricula will vary among the institutions but will essentially cover wastewater treatment operations including classroom theory and hands-on training in a nearby cooperating wastewater treatment plant as well as basic training in algebra, general biology, microbiology, hydrology and practical physics. About 20 students will attend each program. Graduates receive associate of science degrees and will be eligible under voluntary or mandatory state certification programs to apply for superintendent positions of medium-size wastewater treatment plants.

During the past five years the number of undergraduate courses dealing with the environment has increased significantly. This increase in course offerings has not been matched by a corresponding increase in qualified staff to teach these new courses. Therefore, in FY 1974 two short-term institutes will be held to retrain undergraduate faculty in water pollution control techniques. They will be given at Tufts University and Utah State University in June 1974. This training is intended to fill the gap between entry level operator training and the three to five-year professional training.

As the shortage of manpower for water pollution control becomes more acute the importance of senior level entry training in four-year design engineering will increase. This can be attributed to the entrance requirements to assume responsibility previously reserved for the "professional" level.

With construction grants presently funded at the multi-billion dollar level annually and with the growing manpower requirements to service these facilities as established by all manpower projection studies, it appears that this will be an important area.

E. DIRECT TECHNICAL TRAINING PROGRAM

Under Subsection 104(g)(3)(C)), (formerly 5(a)(5)) and 5(g)(3)(C)), of the Act, EPA is authorized to provide training in technical matters relating to the causes, prevention, reduction and elimination of water pollution to personnel of public agencies and other persons with suitable qualifications. Under this authority EPA provides its own program of direct training and related supportive activities to supplement the technical activities of others.

The EPA Direct Technical Training Program is directed to key federal, state, local and private personnel who hold responsibility for evaluation, prevention, abatement and control of water pollution. Its purpose is four-fold.

1. To provide a continuing comprehensive program of specialized and technical training generally unavailable elsewhere.
2. To research and develop instructional technology and to provide an instructional program for individuals who are responsible for and/or conduct environmental training or related activities.

3. To provide, on request, instructors and/or training materials in support of training programs of other federal, state and local agencies.

4. To develop new training delivery methods, curricula and materials, such as those for use in correspondence courses.

Most direct training consists of short-term seminars, workshops and courses of one to two weeks duration. These courses, at the National Training Facility in Cincinnati, Ohio and in EPA Regional facilities, are conducted by a highly trained and experienced EPA professional staff.

During FY-74 a number of short courses will be expanded and courses will be offered in regions that lack a permanent training facility. Federal personnel who will be working with programs related to state and local agency activities will form the single largest group of participants. State and local personnel will form the next largest group.

EPA estimates and actual classroom students over prior and forecasted fiscal years are/will be as follows:

Number of Students Fiscal Years				
1972	1973	1974	1975	1976
2,200(a)	2,800(a)	2,850(e)	2,900(e)	3,000(e)

(a)= Actual (e)= Estimated

EPA also supports state training programs for professionals, technical and operator personnel on request through technical

consultation on the planning and development and dissemination of training courses. In addition, the Agency arranges for guest appearances of instructors and provides instructional material such as training manuals, course plans and audio-visual training aids. In FY-73 audio-visual training aids were loaned out for 843 training efforts which were used as instructional material for over 10,000 trainees.

Training provided through scheduled and unscheduled (special) workshops, seminars and short-term courses has increased in volume during the last five years. This increase has been accomplished within restricted funding and an actual reduction in instructor man-hours. The increase in the number of courses presented and the number of students attending since 1969 is as follows:

Year	Courses	Students
1969	45	1,297
1970	57	1,560
1971	59	1,630
1972	89	2,200
1973	73	2,800

In addition, there has been a steady increase of requests by local, state and federal agencies for professional assistance and instructional materials to satisfy their special training needs. This assistance is making it possible for the states to increase their own training capabilities.

F. EPA TRAINING FOR OPERATORS AND TECHNICIANS

1. EXTERNALLY FUNDED

EPA has collaborated with the Department of Labor (DOL), the Department of Health, Education and Welfare (HEW) and the Department of Defense (DOD) in administering and operating five Interagency Programs funded under the Manpower Development & Training Act of 1962 and the Social Security Act, to provide entry level and upgrade training for operators and technicians. These programs are designed to bring persons into the water quality field and to develop and increase the skills of those already employed. They include: (a) MDTA On-the-Job (OJT) Training; (b) MDTA Institutional Training; (c) Public Service Careers Plan B; (d) MDTA Military Transition Training, and (e) Work Incentive (WIN-II) Program.

All five are supported by funds provided by the Department of Labor through Interagency Agreements. Subagreements are awarded by EPA to units of state government, municipalities, special wastewater treatment districts, vocational schools, community colleges and universities.

a. ON-THE-JOB-TRAINING

This program offers entry-level and upgrade operator training in water and wastewater treatment plants through combined classroom and on-the-job training tailored to meet operational realities.

Under the decentralized approach, classroom instruction is given in one plant during working hours depending on the class-plant environment. Supervised OJT is provided by the class instructor (who must have operational knowledge) in the plant

where the trainee is employed. To eliminate gaps in coverage, two correspondence courses and audio tapes are available for self-study at home.

The national program seeks to assist states in developing training capabilities. Initially, the program focused on improving the skills of operators already in place and in turn, upgrading plant operators. Its objectives were to help trainees meet certification requirements and to reduce turnover and stabilize the existing work force. The first Interagency Agreement required that 10% of all trainees be new entry and that the remainder be employed in the treatment plant prior to attending the program. The second Interagency Agreement increased the number of new entries to 30%. The third and fourth years required that 40% of all trainees be new entrants.

The length of the first training course was 44 weeks and consisted of 330 hours of classroom instruction and at least 70 hours of supervised OJT for each trainee. The first 100 hours of classroom instruction were normally devoted to basic courses and varied subjects such as mathematics, biology and chemistry, which would help the trainee during the following 230 hours of job related courses and 70 hours of supervised OJT. This was modified in later Interagency Agreements to meet the needs of the trainees.

Based on the success of the initial program which cost $1,031,775; the second National MDTA-OJT Interagency Agreement was awarded to train 1,000 persons at a cost of $1,260,000. A total

of 1,260 trainees were enrolled into the second program and 1,123 completed the training. The program under this Interagency Agreement represented refinement of the initial training course. The third agreement was awarded to train 870 persons at a cost of $999,978. A total of 1,548 trainees were enrolled and 1,413 completed the training.

The Fourth National MDTA-OJT Interagency Agreement is designed to train 1,000 water and wastewater operator trainees as part of a larger program which includes training for air pollution control, solid waste management and pesticides control. Funding support for the water and wastewater portion is $850,000. Projects will be conducted for 16 to 26 weeks depending upon a trainee's occupational level (16 weeks for upgrade - 20 weeks for new entries and 26 weeks for disabled veterans and/or disadvantaged persons). Forty percent of those trained will be new entries.

Most graduates of the National MDTA-OJT program have received promotions, earned higher salaries, and passed certification examinations. A major strength of the program has been its mobility in searching out the small wastewater treatment plant through decentralized OJT and its introduction of the classroom instruction into the treatment plant. This program is now operated by the 10 Regional Offices of EPA with funding and program guidance coming from Headquarters. During FY-73 this regionalization resulted in 34% more completed trainees for 20% fewer dollars.

The following table is a resume of the third National OJT Agreement:

EXHIBIT VIII

Resume of the Third National	OJT Contract
Effective Date	March 1, 1972
Termination Date	July 31, 1973
Total Amount of Contract	$999,978.00
Total Number of Trainees Under Contract	1,270
Total Number of Trainees Starting Program	1,543
Total Number of Trainees Completing Program	In Progress

Sponsor/Subcontractor	Trainees Entered	Trainees Completed
California State Water Resources Control Board, Sacramento, CA	108	101
California State Dept. of Public Health Berkeley, CA	56	52
Connecticut Environmental Protection Agency Hartford, CN	62	58
Delaware Dept. of Natural Resources, Dover, DE	23	20
Florida State Dept. of Pollution Control Tallahassee, FL	30	30
Georgia Dept. of Natural Resources - EPD Atlanta, GA	22	21
Illinois State Environmental Protection Agency Springfield, IL	23	21
Indiana State Board of Health, Indianapolis, IN	185	166
Kansas State Dept. of Voc. Education, Topeka, KS	22	20
Louisiana State Dept. of Public Health New Orleans, LA	17	16
Maryland Environmental Services, Annapolis, MD	30	30
City of Neosho, MO, Neosho, MO	22	20
Dept. of Environmental Control, Lincoln, NB	41	41
Dept. of Public Health, Las Vegas, NV	26	20
New Mexico Environmental Improvement Agency Santa Fe, NM	40	35
North Carolina State Dept. of Natural Resources Raleigh, NC	21	18
Oklahoma City-County Health Dept., Oklahoma City, OK	61	59
The City of Portland, OR, Portland, OR	42	37
Public Service Institute, Harrisburg, PA	33	33
Environmental Quality Board, San Juan, PR	50	50
South Carolina State Pollution Control Authority Columbia, SC	28	27
South Dakota State Dept. of Health, Pierre, SD	17	17
Tennessee State Dept. of Public Health Nashville, TN	26	26
Utah State Division of Health, Salt Lake City, UT	26	22
Vermont Agency of Environmental Conservation Montpelier, VT	46	44
Virginia State Water Control Board, Richmond, VA	17	10
West Virginia State Dept. of Health, Charleston, WV	43	40

EXHIBIT VIII CONTINUED

Sponsor/ Subcontractor	Trainees Entered	Trainees Completed
Texas Water Quality Board, Austin, TX	45	35
Dept. of Health, Div. of Environmental Health St. Thomas, VI	10	10
City and County of Honolulu, Honolulu, HI	26	21
Metro Sanitary District of Greater Chicago Chicago, IL	22	19
Idaho State University, Pocatello, ID	59	54
North Central Texas C.O.G., Arlington, TX	92	89
Detroit Metro Water Dept., Detroit, MI	167	141
Binghamton-Johnson City, Binghamton, NY	10	10
Totals	1,548	1,413

b. INSTITUTIONAL TRAINING

The EPA administers the institutional training program in the area of water and wastewater treatment plant operations, for the unemployed and underemployed or those persons with no marketable skill. The first Interagency Agreement was negotiated in FY-1971 for 360 trainees at a training cost of $739,690. Nine pilot regional manpower training centers were established.

A distinctive feature of this 22-week program is coordination of half classroom instruction with half of the course in practical hands-on training at nearby municipal wastewater treatment facilities. Most classes enrolled 20 students with an operator instructor and related subject instructors. At first the recruiting and placement were conducted primarily by local employment services. Actually 458 trainees enrolled and 323 completed the course, 19 of which continued their education in the field with 289 entering the labor force leaving 15 who could not be located.

Under the national emphasis to assist veterans, inquiries from veterans requesting training resulted in EPA serving as registrar for the courses and referring the applicants to the proper employment services for testing and final screening. The major portion of job placement assistance was stepped up by EPA staff participation. With continuous evaluation, better education programs for students and more maturity of veteran separatees and retirees, the program became more effective under a second interagency agreement in FY-1972 with DOL and HEW for training 260 students at a cost of $551,234.

Included in this agreement was a provision to permit upgrade training of 82 operators.

By the middle of August 1973, a total of 299 had been enrolled for entry level training with 178 in jobs, 14 continuing education and 38 in training. Ten more trainees with committed job openings had yet to be enrolled. The upgrade segment had 68 enrolled out of the anticipated 82 operators. In Mississippi where 50 of these have been hired for training the majority are from the disadvantaged ranks.

Under this agreement, institutional training is scheduled for completion and termination in early 1974. A summary of the program's activities to date is included below:

EXHIBIT IX

Summary of Institutional Training Program

FY-1971 Sponsor/Subcontractor	No. of Trainees		Starting Date	Training Location
Charles County Community College	40		1/25/71	LaPlata, Md.
Kirkwood Community College	60		2/1/71	Cedar Rapids, Ia.
Atlanta Area Technical School	40		2/22/71	Atlanta, Ga.
Delaware State College	40		2/1/71	Dover, De.
Columbus Technical Institute	40		5/3/71	Columbus, Oh.
Brevard Community College	40		6/21/71	Cocoa, Fl.
Delgado Junior College	60		6/21/71	New Orleans, La.
Penn Valley Community College	40		6/22/71	Kansas City, Mo.
Miami Dade Junior College	30		9/7/71	Miami, Fl.
Kirkland Hall College	15		11/15/71	Easton, Md.
Charles County Community College	20		6/26/72	LaPlata, Md.
Union College	20		6/27/72	Cranford, N.J.
Kirkwood Community College	20		6/28/72	Cedar Rapids, Ia.
FY-1972				
Delgado Junior College	20		3/20/72	New Orleans, La.
Charles County Community College	25	Water		
	25	W/Water	2/3/72	LaPlata, Md.
Miami Dade Junior College	10	Water		
	30	W/Water	2/28/72	Miami, Fl.
Cedar Crest College	70		2/7/72	Goodland, Fl.
Kirkwood Community College	20	Water	2/28/72	Cedar Rapids, Ia.
Columbus Technical Institute	20		5/1/72	Columbus, Oh.
Junior College District of Metro Kansas City	20		3/1/72	Kansas City, Mo.
Denver Community College	40		5/15/72	Denver, Co.
Gulf Coast Wastewater Authority	12	Upgrade	4/2/73	Houston, Tx.
Kirkwood Community College	20	Upgrade	3/15/73	Cedar Rapids, Ia.
Mississippi Valley State College	20	Upgrade	4/9/73	
Kirkwood Community College	14		5/15/73	Cedar Rapids, Ia.
Mississippi Gulf Coast Junior College	30	Upgrade	7/1/73	Gautier, Ms.
Union College	10		6/29/73	Cranford, N.J.

Graduates of the 22 or 24-week courses have been the catalyst in demonstrating that trained personnel is a most necessary component in proficient operations of wastewater treatment plants with secondary treatment and above. Superintendents as a whole are willing and anxious to employ the trainees from the training programs.

The Institutional Program, in less than two years, shows numerous benefits: (1) Reduction in unemployed ranks; (2) a cadre of employees who are entering semi-professional careers; (3) operators better equipped to utilize the capabilities of the more sophisticated plants and; (4) state regulatory agencies have become convinced of the need and benefits derived from training. These superintendents have expressed the need for training present personnel. The market for certified operators is expanding daily.

Attempts have been made at all training sites to secure college credits for the course and to have a state certification test given near graduation date. In a survey of 75 graduates in 1973, the average starting wage was $3.27-1/2 cents per hour. Within 9 months time this rose to $3.69 per hour. Success stories are on file where graduates have become head operators, superintendents, instructors or have been accepted in state agencies.

Two of the educational institutions have incorporated the program as part of their regular technical courses.

A need is readily observed for at least several sites to train the unemployed who are unable to enter the field because of their present habitat in relation to plants with openings and lack of funds to support their families or finance training elsewhere,

The low starting wages of smaller communities are a deterrent to the unmarried who are mobile. Job placement assistance is most important in solving both the community needs and the unemployment and is valuable in staffing plants at scattered locations.

Already a few of the graduates have become instructors. A number of highly qualified ex-military teachers have graduated and are now in plant operations to gain the necessary experience in certification to become operators, thus combining two careers in one.

c. PUBLIC SERVICE CAREERS (PSC)

With the initiation of the Public Service Careers Program, and specifically its Plan B, which is tailored to channel funds from federal agencies to state and local agencies, EPA negotiated an inter-agency agreement with DOL to train 1,355 disadvantaged persons newly or previously employed in wastewater treatment plants. Five states, Texas, Virginia, South Carolina, Wisconsin, Alaska and the Virgin Islands were awarded contracts to participate in the EPA program which began in November 1970 and will cost $2,252,689.

Almost all sponsoring agencies have subscribed to the theory of upward mobility for current employees and have secured agreement from employers to furnish vacancies for entry level jobs.

This approach has resulted in an initial disproportion of entry to upgrade training. Agreement between the DOL and EPA calls for a total of 600 entry level trainees and 755 upgrade trainees. As of July 31, 1973 total enrollment in the program was 2,749 of whom 1,242 were at the entry level and 1,507 were being trained for upgrade positions.

EPA's PSC Program has been extremely successful. Through the PSC 1,015 persons have been hired into and trained into entry level jobs, while upgrade training has improved the skills and raised the salaries of over 1,100 others. Although agreement commitments call for a total of 1,355 trainees this figure was exceeded by 80% upon contract termination on September 30, 1973. Throughout the program only 310 have been terminated prior to completion. PSC has been able to reach all segments of the disadvantaged spectrum including young persons, minorities, women, school dropouts and handicapped persons with a program designed to provide them with marketable job skills in a growing industry. Efforts to assist Viet Nam veterans entering the job markets have been particularly successful.

Listed below is a summary of enrollment in the PSC Program including sponsors, trainees, project start dates and locations.

EXHIBIT X

Summary of Public Service Careers Program

Sponsor/Subcontractor	No. of Trainees	Starting Date	Training Location
State Board for Technical and Comprehensive Education	148 entry 144 upgrade	12/70	Columbus, SC
North Central Texas Council of Governments	276 entry 253 upgrade	11/70	Arlington, TX
Texas Water Quality Board	166 entry 166 upgrade	1/71	Austin, TX
Public Works Commission	9 entry 9 upgrade	1/71	St. Thomas, VI
Wisconsin Board of Vocational, Tech. and Adult Education	25 entry	1/71	Madison, WI
State Water Control Board	127 entry 123 upgrade	1/71	Richmond, VA
Alaska Water Laboratory	4 entry	8/71	College, AK

d. TRANSITION TRAINING

Recognizing the potential manpower for water pollution control represented by returning servicemen from Viet Nam and elsewhere overseas who already have basic skills as a result of their military experience and training,EPA negotiated an interagency agreement with the Departments of HEW and Defense to establish a program of Transition Training in entry level operator positions. The purpose of the Transition Training Program is to provide veterans with marketable skills for employment in wastewater treatment plants through retraining before discharge from the service.

Over 1,300 servicemen have been trained in this program which began during November 1970.

Basic education and OJT are provided by joint facilities (military institutions in or near wastewater treatment plants and nearby academic institutions). The duration of the course is 12 weeks or 480 hours. Total cost of the program including the cost of instructors, supplies, equipment, program administration and supervision and job location assistance is $1,981,000.

In addition to managing the Interagency Agreement for Transition Training, EPA performs other related functions. First, it coordinates efforts to place successful trainees in water or water pollution control plant jobs upon their separation from the military service. EPA also has a responsibility to provide job counseling for veterans with whom they come in contact or those that contact EPA. In the future, EPA intends to encourage veterans to further their training

by enrolling in a junior or community college offering a one or two-year curriculum in water and wastewater technology or by seeking employment in a treatment plant offering EPA or state/local sponsored OJT in order to qualify for higher level jobs.

Secondly, EPA, through direct contact with VA offices, encourages the Veterans Administration to channel veterans into water pollution control occupations and training programs. For example, it has distributed guidelines to VA State Agencies which approve wastewater treatment plant operator training programs recommending the following:

Option 1: Enrollment in an EPA sponsored training program if the trainee is within commuting distance of one of EPA's training projects.

Option 2: Enrollment in a training project equivalent to the EPA sponsored program which may be sponsored by a state or local water pollution control agency if the trainee is within commuting distance of the training project.

Option 3: Enrollment in a correspondence course which could be administered by the state water pollution control agency and/or EPA's Manpower and Training Regional and Headquarters organizations if no training projects are available or accessable under Options 1 and 2.

Since the last report to the Congress EPA has started new training programs in the Far East and in Europe. The first project was started in Okinawa. EPA, in cooperation with the Department of Defense branched out into two additional areas; one in Korea and one in the Philippines. Subsequently, four additional sites were added in Germany and one in England. EPA has just completed negotiations

for a new Military Transition Program for $650,000.

Listed below is a summary of the Transition Training Program:

EXHIBIT XI

Summary of Transition Training Program

Sponsor/Subcontractor	No. of Trainees	Starting Date	Military Installation
harles County Community College, LaPlata, MD	70	11/9/70	Ft. Belvoir, VA
ayetteville Technical Institute, Fayetteville, NC	70	12/7/70	Ft. Bragg, NC
l Paso Independent School District, El Paso, TX	70	12/1/70	Ft. Bliss, TX
entral Texas College, Kileen, TX	70	1/18/71	Ft. Hood, Tx
range Coast Community College Costa Mesa, CA	30	1/11/71	El Toro Marine Base
ontra Costa Communtiy College District, Martinez, CA	40-48	9/7/71	Treasure Island, NAS, CA
Sinclair Comm. College, Dayton, Ohio	40-48	9/7/71	Wright-Patterson AFB
Clover Park Voc. Tech. Inst., Tacoma, Washington	30	7/12/71	McCord AFB
San Diego Comm. College District San Diego, CA	40-48	8/16/71	San Diego NAS
Sumter Area Tech. Ed. Center, Sumter, SC	40-48	7/26/71	Shaw AFB
Charles County Community College	40	1/72	Andrews AFB
Wayne County Community College	40	2/72	Seymour Johnson
Orange Coast Community College	40	1/72	El Toro
University of Kentucky	40	2/72	Fort Knox
Neosho	156	5/72	Far East
University of Hawaii	30	5/72	Schofield Barracks
Kirkwood Community College	104	10/72	Europe
Kirkwood Community College	60	2/73	Europe
Charles County Community College	60	2/73	Andrews AFB
Clover Park Voc. Tech. Inst.	40	2/73	McCord AFB
San Diego	30	3/73	San Diego NAS
Neosho	60	5/73	Far East
Hawaii	30	5/73	Schofield
Orange Coast Community College	30	5/73	El Toro

e. WORK INCENTIVE (WIN-II)

The EPA has just negotiated an Interagency Agreement with the Department of Labor for a Work Incentive Program (WIN-II). This program is funded for $1,000,000 and designed to provide remedial education and skill training for 700 adult welfare recipients on Aid to Families with Dependent Children (AFDC). The program objectives are to train and provide job development assistance in placing trainees in established budgeted positions in public or quasi-public agencies.

It is estimated that there will be five local project sponsors. The scope of this program will include training for over 400 in water and wastewater or related occupations. The remainder will be trained in other pollution areas.

2. INTERNALLY FUNDED

To date, Subsection 104(g)(1)) -- formerly Subsection 5(g)(1)) of the Act -- which authorizes a pilot program for supplemental manpower development and training programs for persons entering into operations and maintenance of treatment works and related activities, has been used to provide update and upgrade training for existing plant operators. Training was also provided for Training Program Instructors, and for specialized courses in advanced Waste Treatment. Since the program's inception with FY 1971 supplemental funds, 138 Grants have been awarded to 40 States and 15,800 Trainees from all 50 States plus the District of Columbia, Puerto Rico, and the Trust Territory, have been trained.

Section 104(g)(1) training is summarized below:

Program	Total Trainees	Total Amount
State Operator Training Programs	13,200	$2,100,000.00
National Impact Programs and Special Programs	2,100	1,160,000.00
	15,300*	$3,260,000.00

The Pilot Program to date has:

Established a mechanism to initiate quickly the training necessitated by an accelerated program.

Provided an initial framework upon which the States can build and for which they can eventually assume responsibility.

Summary descriptions of each program appear in Exhibit XII.

* Includes trainees also reenrolled in short courses and correspondence courses.

(A) STATE OPERATOR TRAINING GRANTS

A wide range of operator training needs has been identified by State Water Pollution Control and other Public Agencies across the Country. Given the availability of funds under the Pilot Program, the States were asked to suggest innovative projects representing their most compelling needs. Each EPA Region then selected at least one Training Project to answer the State's as well as Regional Priorities for development and implementation, based on the following criteria:

--Replicability
--Geographic Diversity
--Potential for Problem Solving
--Coverage (For example, management Training for Supervisory Personnel, electrical and instrumentation courses, field study, correspondence and so forth).

To date, 114 Grants have been awarded to 39 States, Puerto Rico and the Trust Territory for the development and implementation of operator and operations - related training programs. These projects cover the following major needs among the several States:

(i) Management training for first-line supervisors to expand and upgrade administrative skills of persons involved in operation and maintenance of wastewater treatment facilities to improve overall plant efficiency and personnel performance.

(ii) Phosphorous reduction training programs. These programs must assist in demonstrating feasible control processes because states are now legislating for phosphorus reduction.

(iii) Electrical and instrumentation courses for plant personnel to provide expertise in preventing plant shut-down as a result of minor electrical and instrumentation problems; in other words, preventive maintenance training in these critical areas.

(iv) General skill improvement training for higher level plant personnel (operators and technicians). Most of our training effort falls in this category.

(v) Information and orientation seminars for local officials and policy decision-makers to demonstrate their unique function in the solving of pollution problems in their own sectors.

(vi) Mobile laboratory programs have been initiated in cooperation with the Department of Labor to provide more extensive laboratory methods to operators who either are unable to attend on-going programs or have inadequate laboratory facilities at his own plant. The municipal decision makers are also able to observe what equipment is necessary to perform the required tests to meet Permit standards.

(vii) Certification programs to update and upgrade operators in order to pass mandatory certification tests as each state enacts their mandatory certification laws.

(viii) Water supply system programs to train operators of potable or drinking water systems. Four grants were tendered in this area. Also, many small town operators have responsibility for both water and wastewater treatment and require training in both areas.

(ix) Small Plant (usually extended aeration package plants) and lagoon training in a short-course format for the small town operator.

(x) Minority Programs In answer to a need to provide training to Blacks, Indians, and Spanish-speaking operators. Several special programs have been provided at minority institutions and various agencies to provide training in a special manner. These programs have helped in retaining minorities and providing career opportunities heretofore unavailable at the entry level.

Each state conducts its own training programs or selects a designate agency for its performance. EPA provides technical assistance at the request of the State and monitors programs periodically to assure program compliance.

Approximately 13,200 trainees have participated in these programs at a cost of $2,100,000 since the program's inception in July of 1971.

(B) NATIONAL IMPACT PROGRAMS AND SPECIAL PROGRAMS

Twenty-four grants were tendered to various agencies to develop programs under the National Impact and Special Project portion of our activity. These grants were made to various institutions to develop projects that were national or inter-regional in scope and were considered prototypes with national implications. The lessons learned were to be useful for all training programs throughout the country. The method helped us to avoid "reinventing the wheel" in duplicating innovative programs with national applicability in several states rather than using the results and disseminating them to interested states individually. Types of programs developed under this category are as follows:

(1) Curriculum and materials development programs to keep abreast of improvements in the state of art and to disseminate these curricula and materials to the various training efforts in the several states.

(2) Correspondence Field Study program to reach plant personnel in hard to reach areas unable to participate in on-going training programs. For this purpose a grant was made to the University of California to administer this training course for over 4,000 operators at no cost to the trainee.

(3) Plant start-up training to operators in the Trust Territory for newly constructed plants on various islands. This program was developed to observe if intensive training were given prior to start-up, we might avoid the initial drop-off in plant efficiency during the first year shake down.

(4) Specialized Training in Advanced Wastewater Treatment. When the Pilot Program was authorized, few programs on advanced wastewater treatment operations were offered at the State and local levels. EPA awarded two grants under the Pilot Program for development of two advanced experimental and demonstration projects to provide intensive technical training in the operation of wastewater treatment processes for advanced waste treatment operators, treatment plant supervisory personnel, public works department personnel,and others with a need for such training. Both recipients of these grants, the Tennessee Department of Public Health and the Texas Engineering Experimental Station, were selected on the basis of the unique contribution they could make to the program. Both contractors have well-qualified staff personnel capable of conducting the programs. The total cost of the two advanced wastewater treatment programs, including trainee subsistence and travel, will be approximately $305,000.00. Each of these programs is discussed briefly below.

a. Tennessee Program. The State of Tennessee is in an area currently moving from primary to secondary treatment, and the State Department of Public Health was in the process of establishing a training laboratory, usable for such courses, at the time the grant was awarded. The program is regional in concept and is designed to reach 60 trainees from states in the southeast region of the United States. Enrollees receive four weeks of classroom instruction, followed by on-site plant visits. Participants from the State of Tennessee will receive additional on-the-job training over a four-week period following the classroom phase of the program. The pilot program will be used to develop a blueprint for similar regional and State programs.

b. Texas Program. The Texas Engineering Experimental Station, with a large research and development investment, is in one of several states moving from secondary to tertiary treatment; it already had a training laboratory at the time of the grant award. The Texas program was regional in concept at inauguration but was designed to become national as it developed. The program will provide training in advanced wastewater treatment to 130 participants

from several sections of the nation, especially for plant personnel from systems utilizing (or soon to utilize) advanced treatment processes. Courses will be conducted in several locations throughout the nation and the Texas Experimental Station.

(5) Advanced Instructor Training. Instructors of the basic operator training courses also required upgrade training in advanced teaching techniques to instruct these and higher level training programs. A pilot project was initiated to satisfy this compelling need.

This project, referred to as Phase II and III Instructor Training, provides advanced education techniques to operator training instructors who have already learned basic education skills. It represents a refinement of the basic Phase I training course currently offered under EPA's Technical Training Program. The course emphasizes motivation, sensitivity training, design of effective instructional techniques, and evaluation and utilization of learning resources.

Grants were awarded to an association of instructors and to Drake University to develop and conduct this training, which began in June 1971. To date 150 instructors have enrolled in the course. Participation in the course provides the advantages of contact with professional educators, more sophisticated education skills, and the opportunity for both college credit and upgrading of instructor credentials.

(6) National decision-maker workshop to demonstrate to 100 selected State officials who could carry the program ideas back to their individual states and implement these programs with their own municipal decision makers.

(7) Federal Agency Operators Training Program. To take specific area training programs to the operators of treatment facilities in the National Parks and U.S. Forests as requested by operations and Maintenance Engineering personnel of these two respective agencies.

National Impact programs and Special Projects have provided training for 2100 persons at a cost of $1,160,000 since July of 1971. Twenty four separate programs were implemented.

EXHIBIT XII

SUMMARY OF INTERNALLY FUNDED TRAINING PROGRAMS

I. National Impact Programs and Special Projects

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Charles County Community College	La Plata, Maryland	104,667	7/1/71	0	A program to develop waste treatment plant standard operating procedures and technical training materials related to waste treatment plant operations.
Drake University	Des Moines, Iowa	54,174	6/1/71	50	Improve the instructional skills of trainers; emphasis on motivation, sensitivity training, designing effective instructional practices, and evaluation and utilization of learning resources. Three year program.
Association of Clean Water Teachers and Instructors of our Nation (ACTION)	Costa Mesa, California	20,000	7/1/72	20	Training Course for Instructors, to precede the Drake Univ. Course, which will stress technical updating in a workshop format.
U. of Calif. at Sacramento	Throughout USA	71,550	7/1/72	4133	Field Study Correspondence Course distribution for hard to reach, and rural operators unable to attend on-going training programs (2 yr. program)
Texas Water Quality Board	Various Plants and Labs in Texas	87,000	7/1/72	384	Upgrade program for 384 Mexican-American operators. Two-year project with part of funds furnished by DOL.
North Central Texas Council of Governments	NCTOG Training Center, Dallas	55,000	7/1/72	80	Upgrade 80 Spanish Surnamed operators in the GED and providing training to assist operators to pass mandatory certification exams.
El Paso Comm. College	Colorado Springs Colorado	23,750	7/1/72	20	Certification upgrade program for 20 Mexican American operators in Southern Colorado.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Tennessee Dept. of Public Health	Middle Tenn. University	159,407	6/1/71	60	Demonstrate innovative and unique training procedures for the operation, maintenance, and control of advanced biological waste treatment processes and facilities. These pilot program training methods will be utilized in developing regional or national programs. 3 year project.
Texas Engineering Experiment Station	Dallas Water Reclamation Research Center	101,164	7/1/71	130	Two year training program including: 5-day courses in chemical-physical waste treatment processes utilizing a pilot plant for providing intimate operating experience. Special operational instruction in activated sludge and AWT maintenance and control.
Kirkland Hall College	Easton Maryland	22,627	8/15/71	0	A program to correlate information from four state decision-maker projects and prepare for a national conference.
Kirkwood Community College	Annapolis Maryland	82,060	4/1/72	100	Implementation of National decision maker workshop. 100 selected state officials met to receive instruction on how to carry on program in their own state.
Kirkwood Community College	Washington D.C.	40,270	2/1/73	0	Provide consulting expertise to follow-up in assisting state decision maker programs to plan and implement state programs.
Technical School	Various Gov't Installations	100,347	6/1/72	360	2 year project to provide training to operators of Federal facilities treatment plants. Instructors go to a site selected by U.S. Forest Service and National Parks and train in a preselected training need.
Kirkwood Community College	Cedar Rapids Iowa	30,000	2/1/73	30	Project to retrofit 6 donated US Army trucks as mobile laboratories and train instructors in proper use of vehicles and laboratories.
Association of Clean Water Teachers and Instructors	Seattle, Washington	10,000	6/1/73	200	Provide coordination for National Water and Wastewater Operator Training Instructors Workshop in in November.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
National League of Cities	Washington D.C.	20,000	5/15/72	0	Grant tendered to develop a network of National League staff people in various cities to be a contact for trainees seeking employment after completion of training and to distribute training information to municipal officials.
Neosho Technical School	Neosho Missouri	25,300	2/1/73	30	Provide scholarship funds to UE Military Transition Program graduates from Overseas 6 months of intensive full time training is given to each trainee.
Kirkwood Community College	Cedar Rapids Iowa	19,966	2/15/73	0	Feasibility study program to present a plan to interested states in implementing Section 109(b) of Public Law 92-5[illegible] building a $1,50,[illegible] ate training center.
Association of Boards of Certification	Washington D.C.	19,98[illegible]	1/1/73	0	Program to assist this Board to perform an alignment of certification criteria throughout the US as regards examinations, staffing and classification.
Alcorn A & M	Mississ[illegible]	18,455	7/1/73	16	A minority school program to train Black laboratory and operations personnel in Water and Wastewater Treatment plants.
Durham College	Durham North Carolina	33,506	6/8/71	50	A training program to provide instruction to Minority plant personnel in order to upgrade them and assist them in obtaining certification as plant operators. 3 year program.
California Institute of local Self-Government	Throughout State	19,968	5/22/72	500	A series of 8 seminars to acquaint local decision makers with problems associated with Water Pollution and the training required of operators to solve problems.
Institute of International Education	New York, N.Y.	10,000	4/1/72	0	A grant to assist in compiling an International Directory of Environmental Study Programs. Several Foundations plus EPA combined in the effort.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Institute of Social Technology	Barranquitas P.R.	5,000	7/1/72	50	Supplementing existing program to increase the awareness of educational leaders in Puerto Rico to the importance of having trained operational personnel in environmental efforts.
			State Operator Training Programs		
			Region I		
New England Inter-State Water Pollution Control Commission	Mobile Lab	150,165	6/28/71	380	Utilizing a Mobile Laboratory throughout New England for the training of wastewater treatment plant operators and related activity personnel to increase the operating efficiency of existing wastewater treatment facilities and sewage collection systems through the upgrading of skills of present employees. 3 year program, plus a program to train operators to become in-house training instructors.
Maine Dept. of Health & Welfare	Water Facilities in Maine	25,145	1/20/72	30	Two-22 week courses of classroom and OJT in the operation of drinking water plant operations. New State certification requirements forced a need for update training.
Vermont Dept. of Health	Technical Colleges	32,460	12/31/72	130	A series of two day short courses to prepare water system plant operators to pass mandatory certification.
			Region II		
New York Dept. of Environmental Conservation	New York City Buffalo Syracuse	129,400	6/14/71	1300	A series of five Grants for the training of Water and Wastewater Treatment Plant Operators in order to update and upgrade them to meet state certification requirements. One and two week short courses including plant safety.
Bronx Community College	Bronx N.Y.	5,756	4/1/72	40	A program to assure an adequate supply of trained operators by focusing on High School Juniors in a summer course for technically oriented students.

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EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Middlesex Community College	Edison New Jersey	6,430	4/1/72	160	Four 2-day seminars at various locations to train operators in AWT methods, package plant operations, instrumentation analysis.
Puerto Rico Aqueduct and Sewer Authority	San Juan P.R.	5,500	7/1/71	48	A supplemental effort to an existing CAMPS training program to update existing authority plant personnel in the latest treatment methods.
New York U. at Delhi	Delhi, N.Y.	13,264	7/1/73 Region III	200	One state-wide and two territorial decision maker seminars to train local officials in new requirements to be implemented due to new Water Pollution Control Act.
Charles County Community College	La Plata, Maryland	15,111	9/1/71	120	Project A--Seminars for State and local elected officials to provide information concerning water pollution control programs, legislation, regulations, and fundamental of wastewater plant operations, and maintance, including the need for well-trained personnel to operate the plants. Project B--Training program for State and local regulatory personnel Or WPC plant personnel concerning practical aspects of water pollution control and plant operation and maintenance, including WPC plant inspection and evaluation procedures.
Maryland Environmental Services	Hagerstown Maryland	6,600	5/15/72	40	Wastewater treatment plant operator lab training course. Instruction in sampling, usage, analysis, and calculations, and performance of eleven specific tests and recording.
City of Baltimore	Baltimore Maryland	13,491	3/5/73	60	A water supply treatment operator training course. Safety training for 40 operators and in-depth scientific skill upgrading for 20 operators.
West Virginia Dept. of Health	5 State Locations	18,202	1/14/72	100	Public water supply operator training course for Class III Operators to pass mandatory certification exams. 3 hours per week for 8 week classroom and 15 hours OJT.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Virginia State Water Control Board	Several State Locations	57,000	7/1/71	[illegible]	A multi-faceted 3 year operator training program to update existing plant operators to meet new State and Federal operational requirements. Sewerline inspection personnel were also trained in installation requirements.
Pennsylvania Dept. of Education/ Public Service Institute	Harrisburg, Pennsylvania (various schools)	80,855	6/9/71	[illegible]	A 3 year continuing program to improve skills of present employees in the wastewater treatment field, necessitated by Act 322, Commonwealth of Pennsylvania Certification Act. Both operators and Pennsylvania Dept. of Environmental resources employees receive training.
			Region IV		
N. Carolina Dept. of Natural and Economic Resources	Municipal Labs	6,500	4/1/72	20	Program for higher grade professional operators in lab techniques as well as supervisory and management training.
Mississippi Valley State College	Itta Bena Miss.	20,252	4/15/72	15	Minority school project emphasizing lab training program for entry level personnel. 104 hours of classroom, 64 hours of lab and 32 hours of OJT for each trainee.
Greenville TEC	Greenville S. Carolina	9,218	5/30/72	32	Wastewater treatment plant laboratory personnel training. 2 fold program to prepare instructional materials and procedures and to upgrade and update lab personnel.
Georgia Water Quality Control Board	Municipal Plants	31,960	6/2/71	30	Skill improvement and operators upgrade program. Instruction in plant unit operations, science, math & communications, each trainee will have 168 hours of classroom and 53 hours of OJT.
Piedmont Technical Education Center	Greenwood South Carolina	2,510	7/1/71	30	Three 8-hour days of concentrated effort in the areas of human aspects of management, with emphasis on the human needs of those being managed. increasing human value, making better use of time, how to motivate people, problems of temperament, how to predict human behavior, and individual communication.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Jefferson County Commission (Eng. Dept.)	Birmingham, Alabama	20,960	7/1/71	25	Improve the skills and upgrade present wastewater treatment plant operators. The trainee will receive basic education in areas of math, communications, science, and plant unit operations with the goal of adding substantially to the proficiency of persons at all levels of waste treatment operations.
Trade and Industrial Education	Local school conference rooms	2,544	6/15/72	1,000	A grant to supplment an on-going upgrade program being carried on by the State. Program consists of one-week short courses on itinerant basis throughout the State.
South Carolina Pollution Control Authority	Various vocational-technical schools	19,950	2/1/73	460	Upgrade program for treatment plant operators. 17 week course of 3 hours per week, taught through State's Technical Education Division.
Florida State Dept. of Pollution Control	Tampa, Florida	15,005	1/1/73	60	Two-fold operator training program. First portion for new uncertified operators and the second for advanced waste treatment for certified operators.
Georgia Dept. of Natural Resources	Waycross, Georgia	16,816	2/1/73	20	OJT wastewater treatment plant operator training course to upgrade the talents of new-hires into the field. 168 hours of classroom and 40 hours of OJT per trainee.
North Carolina University at Charlotte	Charlotte, N.C.	13,606	4/1/73	60	A pilot program to upgrade the operating skills of existing plant operators in the Charlotte area. 72 hours of classroom and field trips plus one week intensive review prior to certification exam.
Piedmont TEC	Greenwood, S.C.	2,510	7/1/71	30	Human factors management training for first-line supervisors. Three 8 hour sessions.
Greenville TEC	Greenville S. Carolina	16,884	7/1/72	12	Supervisory personnel at Wastewater treatment plants will be trained in theory, supervisory responsibilities and in-house training capabilities.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Univ. of Kentucky Research Found.	Lexington, KY	43,897	7/1/71	10	Three year continuing program to train entry -level and existing operating personnel, and improve skills of lab personnel so they can perform required analyses of new or proposed standards and update and upgrade existing plant operators with classroom and OJT. Mobile lab training for trainees who cannot attend on-going program.
Mobile Water Service System	Mobile, Alabama	22,500	6/30/73	40	A two-year continuing program consisting of two 24-week sessions on the operation and maintenance of the electrical equipment control and instruments in use at the Mobil Water Service Waste Treatment and Handling facilities.
The Kentucky Municipal League	Kentucky State Parks	7,994	7/1/71	200	Educate municipal officials and "decision-makers" as to the importance of water quality control in view of new standards. Students would be shown the importance of well-trained operating personnel in their wastewater treatment facilities in order to meet their obligations in the field of water quality control.
City of Jackson	Jackson, Mississippi	15,434	3/1/73	30	To train 30 operators in activated sludge treatment for a new $15,000,000 plant in Jackson.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
			Region V		
Michigan Dept of Public Health	Lansing, Michigan	142,313	4/1/72	350	8 weeks of training on operation, control and maintenance of phosphorus removal from sanitary wastewater. Two-phase program: Phase A consists of one day (or half day) classroom instruction each week for 7 weeks. Phase B consists of a five-day week on lab instruction of analytical techniques needed for control of the process. Second year continuation stressed operator training in activated sludge wastewater treatment processes.
Minnesota Pollution Control Agency	Area Vocational Schools	31,555	4/1/72	300	A two year program combining small treatment plant operator training and an advanced class for operations in activated sludge training.
Wisconsin Dept. of Natural Resources	U. Of Wisconsin Extension Service	24,920	4/1/72	80	A program to upgrade presently certified operators to grades I & II to meet new plant classification requirements. Involves 2½ weeks of classroom and lab instruction.
Illinois EPA	State Wide Plants	22,475	5/15/72	50	A program to fund state staff member to be an itinerant instructor to provide follow-up on Field Study course participants.
Detroit Metro Water Dept.	Detroit Mich.	29,000	3/15/73	20	A Program to develop the skills of middle-management personnel who will be making unit process control decisions in regard to the Pure Oxygen process prior full scale operations at advanced waste treatment facilities.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
			Region VI		
Southwest Technical Institute	East Camden, Arkansas	77,307	7/1/71	268	A field training unit to carry the training program to the operator in his local area for the purpose of certification as a sewerage plant operator. Unit will remain in Arkansas and state will fund training costs.
Oklahoma City-County Health Department	Oklahoma City, Oklahoma	20,595	6/24/71	25	330 hours of classroom and 70 hours of over-the-shoulder training designed to improve skills of present plant employees in order to obtain optimum operational efficiency.
Louisiana State Dept. of Health	Various plants and labs	37,102	7/1/71	70	Planning and supervision for various OJT, in-service, and external training programs for water pollution control plant operators and supervisors, including CAMPS projects, and prepared operators for certification examinations. Also provides training of instructors, teachers, and plant supervisors in the conduct of water pollution control training courses, and instruction for health department and other regulatory inspectors in the proper conduct of operation and maintenance inspections. Three year program.
Texas Water Quality Board	Four major cities	5,000	9/1/71	80	Supervisory training for managers of treatment plants discharging more than 2 MGD. 40 hours of intensive management training.
Texas Water Quality Board	Austin, Texas	26,428	7/7/71	150	Provide training in wastewater treatment works operations to Texas Water Quality Board staff. Three technical seminars plus one new employee training program each month for twelve months.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
New Mexico Environmental Improv. Agency	Navajo Reservation	37,800	5/1/72	165	To provide training to water and wastewater treatment system personnel on and surrounding the Navajo Reservation. Cooperative effort with Federal, State and Tribal Agencies.
Texas Water Quality Board		12,175	4/1/73	140	A series of seven three-day Decision Maker Workshops to train municipal water utilities managers in the fundamentals of presenting a community awareness program.
			Region VII		
University of Missouri	Columbia, Missouri	11,931	6/1/71	300	Series of one-day seminars to orient local officials and citizens regarding the State-local-Federal responsibilities for wastewater management.
Central Nebraska Tech. College	Hastings, Nebraska	30,000	7/1/71	20	Development and implementation of curricula designed to develop adequate and appropriate educational competencies for personnel responsible for the prevention of contamination of water resources by those hazardous materials which endanger human health and environment.
Kansas State Dept. of Health	Topeka, Kansas	20,407	6/30/73	200	Provide a training director to State staff to expand and improve training opportunities to plant operators in order to provide a transition from voluntary to mandatory certification.
Missouri Water Pollution Control Board	Municipal labs	21,900	4/1/72	60	An upgrade training progam for wastewater treatment plant operators throughout the State. Will stress actual laboratory procedures and analysis to meet new regulatory requirements.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Iowa Dept. of Environ. Quality	Municipal facilities	39,601	4/1/72	130	Provide a member on State staff to coordinate all water and wastewater training efforts in the State. Will concentrate on participants in field study correspondence course.
Neosho Technical School	Jefferson City and Springfield, MO	3,700	5/1/72	40	Two one-week short courses on lagoon operation prior to State certification exam.
Nebraska State Dept. of Environ. Control	Municipal plants	23,280	5/1/73	50	Utilize a full time training specialist to coordinate wastewater treatment plant operator training in the State, plus provide a manpower planning capability to the State Agency.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Curators of the Univ. of Missouri	Vocational centers	18,605	7/1/72	750	A specialized training effort to tie-in the effects of soil erosion and sedimentation to treatment plant activities. Trainees will be vocational teachers and material will be provided to them to dispense through area training courses.
Neosho Technical School	Jefferson City, MO	5,725	4/1/73	45	Sewage treatment lagoon operator training course to develop instructional criteria to be presented in courses throughout Region VII. Three one week short courses coordinated with certication exams.
Neosho Technical School	Neosho, MO	2,500	6/1/73	20	Pilot program to instruct plant engineers in plant operations. Design engineers will be given a one week intensive program to acquaint them with operational difficulties to improve their designs.
Missouri Clean Water Commission	Municipal labs	16,860	7/1/73	80	A laboratory training program designed to improve the skill of operators in performing wastewater analysis. Classroom and OJT will be employed.
			Region VIII		
Colorado Water Pollution Control Division	Grand Junction, Colorado	46,578	7/1/71	250	Three year progam to provide a trained coordinator who will organize and conduct a training program for scattered wastewater treatment plant operators utilizing classroom and OJT instruction for 250 trainees. The coordinator will work with the State Vocational Education Department and Community Colleges to assist the program and provide additional training opportunities.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
Wyoming Department of Environ. Quality	Cheyenne, Casper Laramie, Wyoming	28,671	6/1/72	20	A two year media development program utilizing an innovative presentation procedure using television sets and tape players placed in a plant for instructional purposes.
Montana Dept. of Health and Envir. Sciences	Municipal facilities	43,050	4/1/72	65	Provides 72 hours of classroom, 100 hours of correspondence study, and 40 hours of individual OJT for each trainee in small plant operator training.
North Dakota Dept. of Health	Municipal facilities	24,325	42	45	Operator training program for small plants consisting of three 12 week courses for 14 operators in each session.
			Region IX		
California State Water Resources Control Board	San Marcos, Calif.	230,819	5/1/71	505	Training of wastewater treatment plant operators and related activity personnel to improve substantially their proficiency in operating, maintaining, supervising, designing, and managing facilities through a "problem- oriented" approach to environmental enhancement. Training site will include an operating wastewater treatment facility.
Department of Public Works Trust Territory	Honolulu and Pacific Islands	80,000	4/5/72	15	Long term training program to supply trained operating personnel for newly constructed treatment works throughout Trust Territory. Trainees go to Hawaii for training then return to islands to operate new plants.

EXHIBIT XII (Cont'd)

Grantee	Training Site	Amount of Grant	Starting Date	Number of Trainees	Summary of Training Program
			Region X		
City of Portland	Portland, Oregon	13,635	6/1/73	20	A program to train present plant personnel in activated sludge processing. A new plant is being constructed and all operators require start-up training. 160 hours of instruction and 960 hours of OJT.
Washington Dept. of Social and Health Services	Tacoma and Spokane	3,750	4/1/72	40	Assist State to provide in-depth training for 40 specialists on the installation, operation and maintenance of cross-connection control backflow prevention devices.
Linn-Benton Community College	Albany, Oregon	135,909	7/1/71	240	Provide present wastewater treatment plant operators with the perspective and training necessary to make a contribution to the solution of environmental problems caused by modern wastewater treatment plants not being operated and maintained at peak efficiency. Modular concept of instruction over a two year period.